

The catheter is changed daily and through it the pelvis is injected with weak argyrol solution. We prefer bringing out the ureter through a stab near the incision, but we do not always do this. Cigarette drainage behind the peritoneum is necessary as a small hematoma—sure to get infected—is likely to result from the oozing. In certain advanced tuberculous bladder it is not only an act of mercy, but often prolongs life very markedly with immediate relief from the bladder symptoms. Bowel transplants are quite out of the question here, since infection will certainly take place in the gut; for this it is the operation par excellence. I have not yet performed it for this, but I have followed very closely two cases done by my colleague, Dr. Rosecranz, and cannot speak too highly of the procedure in these cases—one now having been done fourteen months—after a history of renal tuberculosis for ten years with a left nephrectomy double tuberculosis epididymis with rupture and prolonged drainage, tuberculous fistula, in ano, and the morphine habit, who has been four months conducting his own chicken ranch in Michigan after an invalidism to my knowledge of five years.

CONCLUSION:

Ureteral transplants to the skin is an act of mercy in certain advanced cases of bladder carcinoma. It is all of that in some cases of bladder tuberculosis and here markedly prolongs life and lessens invalidism. It prolongs life in certain cases of carcinomatous invasion from adjacent extra urinary organs. It saves life as illustrated by Case V. Unlike any other anastomosis of the ureter, the kidney is not insulted in the slightest and drainage can be made perfect. Even bilateral anastomosis to the skin at one sitting is almost devoid of shock in the feeble. It is the most rapid and efficient method of treating pyelitis and restoring kidney function to the maximum.

THE SIGNIFICANCE OF SPINAL DEFECTS AND PAIN OCCURRING IN RELATION TO OCULAR DISEASE.*

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The loss of active interest in any possible relations between the eyes and the structures of the neck, followed the meteoric vogue of operations upon the cervical sympathetic ganglia, in a manner comparable to the operative blight which succeeded the period of complete tenotomies for strabismus.

Many clearly established facts and daily clinical observations attest, however, the continuous activity and importance of the oculo-cervical relations. As early as 1727, according to de Schweinitz,¹ Pourfour de Petit observed that the eye became softer after section of the cervical sympathetic. Verification of this fact led to the belief that "primary disease of the cervical sympathetic ganglia might be the basal cause of glaucoma." The pressure of cervical tumors, of mediastinal polyadenitis, and of fracture-dislocations of the cervical vertebrae, notably of military origin, gave further striking evidence of the effects of deviation of normal sympathetic control over the eyes.

The sympathetic system correlates the various activities of the viscera, the inclusion of the eyes in the visceral chain being shown by the dramatic ophthalmocardiac reflex and its modifications in

disease. This correlation is shown more commonly and constantly by the pupillary changes common to the states of fear and excessive emotion, the ocular changes being linked with complete inhibition of the whole digestive function, with increase in the rapidity of the cardiac and respiratory action, with sudden activation of the suprarenals and thyroid and the immediate conversion of the sugar reserves stored in the liver and the body in general, into the final defense expression of more intense muscular activity.

The results of the excision of the superior cervical ganglion in glaucoma, as collected by Wilder² and by Rohmer,³ show this operation to have been followed by improvement in from 40% to 70% of the cases operated upon. Further tribute to the relations in question and to the operation of sympathectomy as well, was paid in Axenfeld's statement that "there is obtained by this operation in a certain proportion of cases of simple glaucoma, a definite and important result, and in some instances there has been a decided improvement, even where a previous iridectomy has failed." A low but constant mortality, the occasional development of tachycardia, exophthalmus, and ptosis and the opposition of the German school led to the abandonment of the operation and to forgetfulness of the significance of the benefits obtained in the successful cases. Two deductions might have been drawn from these cases: First, that a constant irritation in the form of pressure in the intervertebral foramina, or drag or pressure upon the sympathetic chain in its course, may have provoked the iridic and choroidal vasomotor changes which are expressed in the symptoms of glaucoma; second, that such prolonged pressure and irritation may have set up the degenerative changes in the sympathetic nerves and ganglia noted by Fisch,⁴ Cutler and Gibson,⁵ Wilder⁶ and Weeks,⁷ changes which were but little affected, if at all, by division or excision of a fragment of degenerated nerve at a relatively low nerve level. The successful results which followed the drastic removal of the ciliary ganglion in absolute glaucoma by Rohmer, and by Terrien and Poirson support the latter idea. Such deductions explain the recurrences noted after sympathectomy and after other operative measures for the relief of high intraocular tension.

The cervico-thoracic spine, as we have shown elsewhere,⁸ is peculiarly subject to skeletal anomaly, to articular disease and to the effects of spinal distortions. The existence of these abnormal factors, appearing, together with marked contractures or painful spasm of the cervical muscles, with significant regularity in many cases of glaucoma and in some of the obscurer cases of chronic non-inflammatory congestion of the conjunctivae, lend decided weight to the previous deductions.

Ocular vascular tone and its obvious expression as tone of the iris are clearly related to the state of activity of the sympathetic system in general. Postural strain may disturb the cervical sympathetic directly, or reflexly through fibers

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coming from the solar or sacrosciatic plexuses, because of irritations from postural or other causes in segments under their influence. A well known example is the "spastic mydriasis" of children seen in splanchnic irritations. Hypotonus of the irises is commonly seen in that condition of general hypotonus in which the patient sags all over, is muscularly weak and relaxed, has drooping shoulders, frankly bad spinal posture and is mentally inert. Hypertonus, with brisk general and iridic overaction, is characteristic of the opposite physical type, in which spasm and contracture of the posterior cervical muscles are the rule. It is as yet uncertain whether we have the right to conclude from these two extremes that in the relaxed type the unusual dragging of the shoulder-girdle upon the brachial plexus and sympathetic is the source of pupillary sluggishness and dilatations of varying degree, or that the cervical muscular spasm and contractures in the opposite type produce their effect by direct irritation of the posterior nerve roots at their point of emergence through the foramina. Such conclusions are suggested, at least, but will require much more observation, thorough radiographic studies of all suspicious cases, some operative work in the lower neck in certain of the unusual cases, and careful pathological investigation, before the exact nature of cause and effect can be stated with authority.

Numerous cases of pupillary irregularity and of more or less obvious variations in the rapidity and degree of pupillary action may be cited from the literature and from daily experience in connection with enlarged cervical glands, mediastinal growths, aortic aneurysm, pulmonary phthisis, pneumonia, inconspicuous or frank thyroid tumors and all manner of shoulder-girdle, vertebral and brachial traumas and deformities. Inasmuch as most of the severer injuries of the shoulder-girdle region fall at once into the hands of the general surgeon, the gross local lesion usually completely overshadows the finer ocular changes. Where sought for however, the effects of sympathetic irritation or paralysis are found with surprising frequency and often with a bewildering medley of vaso-motor, secretory and trophic symptoms quite unlike the classic Claude Bernard-Horner syndrome. Incomplete forms of this syndrome are seen most frequently however. Miosis occurs most commonly or, in unilateral lesions, inequality of the pupils, the smaller being on the side of the lesion and usually failing to dilate or dilating less rapidly and less completely on shading the eyes. Narrowing of the palpebral fissures, some enophthalmus and ptosis are frequently observed and, in unilateral lesions, a comparison of the eyes may show lessened secretion on the affected side, where the lids may be stuck in the morning owing to the adhesion of the thickened conjunctival secretion. The lessening of the excretion of sweat on the affected side seems to parallel the degree of inhibition of the secretion of tears. Both the ocular and secretory disturbances appear to be more prominent and more permanent when the spinal sympathetic centers are damaged than

when the efferent fibers which come down through the cord from the bulb are involved, for in the case of injury of the latter the symptoms usually subside quickly. In irritative lesions of the neck and cervical cord, among whose causes the postural lesions so commonly seen in the cervical region assume a definite place, the paralytic symptoms are replaced by irritative symptoms, and pupillary dilatation, increased width of the palpebral fissure from spasm of the superior tarsal muscle, unilateral hyperidrosis, and very slight exophthalmus are observed in any combination.

Minor differences of pupillary size and action are noted less obviously in connection with the lesser postural faults in about eighteen per cent. of our cases. Frequently, as Landolt⁹ points out, it is difficult to say in a given case whether the anisocoria is due to mydriasis or miosis—i. e., whether the disorder is paralytic or spasmodic. Landolt's method of solving this uncertainty may be assisted materially by a knowledge of the type of cervical lesion which co-exists.

The minor displacements of the cervical vertebrae which occur with unsuspected frequency in the form of incomplete dislocations or, more correctly, subluxations, may have a direct effect upon the sympathetic fibers of the segments involved either as the result of dragging or pressure. Cyriax¹⁰ has observed several hundred such displacements, confirmed by X-ray no less than by the symptomatic relief which followed the reduction immediately. Such lesions may occur without symptoms, though usually they produce minor degrees of pain, stiffness of the neck and slight limitation of motion. Traction, hyperextension of the spine and rotation or pressure in the direction opposite to the displacement, reduces these deformities without discomfort. If unreduced, compensation becomes established in time with the formation of false joint surfaces, but with a new adaptation of ligamentous tension and a changed line of muscular pull, which naturally becomes unequal on the two sides of the vertebrae involved.

Aside from the sympathetic nervous connection between the eyes and the neck, and excluding the position-sensing function of the cervical muscles which aids the more specific position-sensing powers of the retina and the extrinsic ocular muscles, we have a third relation in the accessory visual function of the cervical muscles. This was first recognized by Lowman¹¹ and myself¹² and was first described by me (*loc. cit.*) under the heading of an accessory visual function. The muscles of the neck, especially the Trapezius, the Erector Spinae and the scapular fixators, hold the head rigid on the neck, fix the neck on the chest during all visual concentration, fix the shoulder-girdle in all finely co-ordinated work of the arms and hands and have a specific place in the achievement of detailed vision hardly less essential than that of the extrinsic ocular muscles themselves. Strains of this stabilizing apparatus occur at times, even with eyes that are functioning normally, either from overuse or abuse. Moments of intense peril, excessive emotion and violent muscular effort, especially when unaccustomed, may

leave an aching neck and even paresthesia and weakness of the hands as temporary residues from this origin. It is clear that this stabilizing function of the cervical muscles is also called into play when accuracy of hearing is necessary and is an important factor in the partially deaf and more particularly when there is decided difference in the acuity of hearing. That such auditory differences may induce spinal curvatures and deformities has long been recognized, but that the cervical muscles participate even indirectly in the normal mechanism of hearing is, we believe, a matter not recognized hitherto. The attitude of the head in listening is, in fact, usually the resultant of putting the better eye and the better ear more or less forward as the need of the moment or the better function of either may demand. Obviously strains of the cervical stabilizing system occur in connection with intense and prolonged auditory effort and have a definite relation to faults of cranio-spinal form and alignment.

We have shown that the cervical and occipital aching and pain which occur in connection with use or abuse of the eyes in all ordinary forms of ocular concentration is due to muscular spasm and soreness over the points of muscular and ligamentous insertion, which are being unduly and unevenly stretched as the result of faulty skeletal alignment. The main defects which we have noted in this connection are abnormal spinal twists and rotations with irregular and painful impingements of normal or of abnormally broad lateral processes, with overlapping impingements of the posterior spinous processes in cervical lordosis, arthritic enlargements of the articulations which frequently involve the whole cervical column, fibrositis and periarticular thickenings due to ligamentous strain and trauma, and cervical ribs. A common fault is the lateral bend with rotation which occurs in scoliosis, where lateral and antero-posterior deviations of the shoulder-girdle exist, with so much stretching of the brachial plexus as to cause brachial pain and the incorrectly termed "brachial neuritis."

In the matter of cervical ribs, or transitional transverse processes, or normal first ribs made pathological by virtue of faulty spinal alignment, it is well recognized that while the fault may have been congenital, injuries which involve the Trapezius and interfere with its function as a support to the shoulder-girdle, or general conditions which bring about lack of tone in this great muscle, are largely provocative of the symptoms. The pressure exerted by the anomalous rib, or by the normal first rib, is nearly always on the lower trunk of the brachial plexus, the symptoms depending on whether the motor, sensory or sympathetic fibers are mainly involved. Neuralgic pains on the ulnar side of the forearm, partial paralysis of the intrinsic muscles of the hand, and of the flexors and extensors of the wrist, muscular atrophy, pallor or cyanosis of the fingers, hypothermia and even trophic ulcers in the distribution of the ulnar nerve, may occur in nearly any combination with or without partial or complete unilateral or bilateral Claude Bernard-Hor-

ner syndrome. Cervical sympathetic involvement is almost constant when the eighth cervical and first dorsal roots are involved in the brachial palsy, with their rami communicantes.

It is the common tendency to hold the head as still and the neck as rigid as possible when suffering from the more painful cranial and ocular conditions. This is almost a postural habit among the more emotive who are prone to some of the milder forms of glaucoma, with a tension just above the normal limits. In such cases nuchal pain and soreness are, in the main, the result of the muscular spasm, exaggerating the effects of the spinal faults which always co-exist. If attention is directed to the cause of this condition, the need for cervical relation explained, and traction, hyperextension of the spine, deep spinal massage and passive movements and hot spinal packs used for the more pronounced cases, the relief is usually prompt, and is followed frequently by surprising improvement in the ocular signs and symptoms.

The majority of patients having chronic inflammatory ocular conditions present decided cervico-thoracic spinal changes, chiefly in the form of tender, arthritic enlargements, marked fibrositis and periarticular thickening, which often, in the glaucomatous especially, bind the sixth and seventh cervical and the upper two or three dorsal vertebrae into a fused, rigid mass which moves "en cuirasse" when any spinal motion is attempted. Whether this represents the irritative cause of the ocular conditions, or is the effect of the latter upon the stabilizing system, is yet to be ascertained. In any event the difficulties and chronicity of treatment in such cases are clearly apparent. False articular surfaces have been produced nearly always and the object of treatment is not the vain end of reinducing free play between the individual vertebrae, but rather that of re-establishing more or less play and of lessening the contractures, fibrous thickenings and vertebral rotations and subluxations. The effect of these pathological changes in modifying the shape and reducing the size of the intervertebral foramina is clearly shown in radiographic studies. Traction and hyperextension of the spine; carefully graduated rotation; deep, protracted, but not too violent massage of the back; thick, hot packs and graduated exercises always give some relief and often give complete relief to the cervical symptoms, together with a coincident reduction of the ocular tension, which may become and remain normal, even without the use of miotics. Not infrequently these means so reduce the blood pressure, generally more or less increased in these cases, that this affords an additional means of indirect relief to heightened intraocular pressure.

The careful study made by Cyriax of London on the marked and often permanent reduction of pathological degrees of blood pressure resulting from manual therapy should be more widely known.

With regard to the method of local spinal treatment I wish to emphasize two points: First, that the improvement in the spinal fault may be brought about in the non-operative cases by a

number of related systems of passive movement, active movement, or gymnastics. The most efficient of these, and certainly the most fundamentally scientific, is the Swedish system of manual therapy introduced by Ling (1776-1839) and elaborated by Branting, Kellgren and Cyriax. This system has a definite, standardized technic and its results are measurably superior to those of the crew of manipulative cults which have sprung up in its wake.

Traction and movement applied with traction, are the fundamental therapeutic means used in all these cases. These identical principles have been employed consciously in surgery, especially in the orthopedic branch, since the time of Sir Astley Cooper, in achieving the mobilization of contracted, contracted and partially ankylosed joints anywhere in the body. Movement applied with traction separates the opposing articular surfaces, elongates the ligaments and muscles, stimulates nerves by this elongation, permits the ready breaking down of adhesions and by the production of flexibility and mobility leads to the relief of symptoms and the recreation of normal posture.

SUMMARY AND CONCLUSIONS

I. Ocular and spinal functions are related: 1, through the direct sympathetic nervous connections; 2, through the aid furnished the position-sensing mechanism of the retinae and extrinsic ocular muscles by the position-sensing mechanism of the neck muscles, and 3, through the accessory visual function of the stabilizing muscles of the neck and shoulder-girdle.

II. Interruptions of these relations may be expressed as symptoms occurring either in the eye or the neck, or both, and unilateral or bilateral according to the form and degree of interruption.

III. Severe cervico-thoracic and brachial lesions and deformities and, less commonly, conditions involving the sacro-sciatic and solar plexuses, may cause paralysis or paresis of the cervical sympathetic, or irritation of the sympathetic, with the production of the vasomotor, secretory and trophic ocular symptoms characteristic of each of these divergent conditions.

IV. The frequent association of minor displacements, anomalies and disease of the cervico-thoracic spine with irregularities of the pupils suggests a relation of cause and effect, with direct pressure or dragging upon the cervical sympathetic chain or upon the rami communicantes as the mediate factors.

V. The frequency with which glaucoma and chronic hyperaemia of the conjunctivae are associated with faults of the cervico-dorsal spine, and the facts that relief of increased intraocular tension may result from appropriate manual therapy of the spine and neck, without the use of miotics, are similarly suggestive.

VI. Strains of the muscular stabilizing system of the head, always exaggerated by faults of skeletal alignment, are responsible for the nuchal aching which follows prolonged or intense ocular fixation. Such strains also appear in acute and chronic intraocular inflammations, as the result of

holding the head rigid in order to reduce the pain due to motion, or to gravitational effect.

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A GROUP STUDY OF 300 CASES OF ARTHRITIS.*

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The work here reported was done at the U. S. A. Base Hospital, Camp Lewis, Washington, extending over a period of sixteen months. It was all carried out under my personal supervision as chief of the section of orthopedic surgery, to which division it properly belonged, since all joint disabilities had to be passed upon by the orthopedist. It was participated in by a large number of medical officers representing the various specialties, to whom the credit is hereby given. Especially I wish to mention Dr. Dudley Fulton, who, in the capacity of chief of the Medical Service, and later as Commanding Officer, did so much to help correlate the various services of the hospital in this work; and also Dr. Carl J. Snitkay, whose energy and ability overcame the practical difficulties of its establishment; and likewise Dr. Alva F. Maine, who brought the therapeutic department into being.

The need of a special arthritis ward in a hospital of 1500 or more patients was apparent from the first. There is a curious mental attitude in the medical profession toward anything called rheumatism. Whether it is a sort of reflection of the well-known saying of the laity: that a man with rheumatism or seasickness never gets any sympathy; or whether there is a real feeling of helplessness on the part of the doctor in doing anything but let the disease run its course; or whether the radical change in supposed etiology from uricacidosis to focal infection has so unseated our grasp of the subject that we hesitate to take hold of a case with vigor and confidence, and pursue any adequate line of treatment; or whether it is a combination of all these factors, I do not know. But I do know that when the arthritis ward was opened, culling 64 of these cases from other wards, not one had had a reasonably complete search for the underlying cause. I hasten to plead guilty of furnishing several of those cases from my own orthopedic wards.

The conception of the disease on which was built the group was one that my experience here recounted has but served to deepen. In young adults arthritis is an infectious disease, systemic in character, with local manifestations, in which joint trauma plays a large part—often the most important part.

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